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ABSTRACT

The story comprehension patterns of 21 good and poor sixth grade readers were examined across four modality combinations for input and output: (1) listening and oral recall, (2) reading and recall, (3) listening and written recall, and (4) reading and written recall. The subjects were asked to summarize important information in a different short story presented for each condition, then tested for recall. Results showed that poor readers' patterns of comprehension were similar to those of good readers in terms of the quality of story schema represented, the number and types of inferences drawn, and the selection of important information in the hierarchical structures of the stories. There were no significant differences between groups related to modality. The one area that did distinguish poor readers from good ones was the number of spelling errors made. (Appendixes contain copies of materials used in the study.) (FL)

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Strategies for Comprehending Important Information in Text by Good and Poor Readers

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Abstract

Story comprehension patterns of good and poor readers were examined across four modality combinations for input and output: listening - oral recall, reading - oral recall, listening - written recall and reading - written recall. Twenty-one good readers and twenty-one poor readers from sixth grade were asked to summarize important information in a different short story presented for each condition. The subjects were tested individually in one 45 minute session. The results showed that poor readers' patterns of comprehension were similar to good readers in terms of the quality of story schema represented, the number and types of inferences, and the selection of important information in the hierarchical structure of the stories. There were no significant differences between the groups related to modality. Good readers were better than poor readers in the higher quantity of story propositions recalled and in significantly fewer spelling errors in written protocols. Implications are discussed in terms of the different types of story schemata, varying levels of complexity in story texts and the effects of surface features, such as spelling, on teacher expectations.

As students move beyond the elementary grades, they are normally expected to learn new concepts by reading long passages of text, listening to lectures and class presentations and then remembering important information from these sources. At the same time, researchers and educators have frequently identified groups of poor readers who seem to have mastered basic word recognition skills, but continue to have problems in such comprehension tasks in the later grades (Cromer, 1970; Roit, 1977; Vellutino, 1977; Vernon, 1977). Such comprehension problems have already been studied in a vast number of different ways, many of which involve examining answers to probe questions or using techniques such as cloze procedures for manipulating properties of texts. The present study sought to examine potential comprehension problems within the context of "schema" theories of reading (i.e. Anderson et al, 1978; Pearson and Johnson, 1978; Rumelhart, 1977a) and more particularly, recent research on story comprehension (e.g. Mandler and Johnson, 1977; McConaughy et. al., in press; Rumelhart, 1975, 1977b; Stein and Glenn, 1979; Thorndyke, 1977).

Stories were chosen as stimuli rather than expository texts, for several reasons. First, stories represent a familiar genre in the culture so that use of stories should help to minimize potential differences among readers due to variation in background knowledge. Researchers on story comprehension have shown that even young children have a sense of story (Applebee, 1978, 1980) and a basic knowledge of story structure (Mandler and Johnson, 1977; Stein and Glenn, 1979). Second, systems have been well developed to describe the underlying macrostructure of story texts. Though individual researchers differ in terminology, they generally agree on what constitutes basic story structures and research has validated these theoretical descriptions (see Stein and Trabasso, 1982 for review). Theories of expository text structures, on the other hand, are less well developed and there are wide variations in systems of analysis and the types of structures which have been described (see Tierney and Mosenthal, 1982, for review). Consequently, it was felt that stories as stimuli would provide more predictable structures for examining reader differences in basic schema knowledge. Third, a story grammar could be used for ordering elements into levels of importance in a global hierarchial structure (Bower, 1976; McConaughy et al, in press; Rumelhart, 1977b; Thorndyke, 1977). This allowed for direct examination of readers' abilities to select important information from a given text according to its structure. It was felt that this was a more sophisticated measure of comprehension than more traditional methods such as finding the main idea (Guthrie, 1977). It was also an improvement over relying solely on subjective ratings of propositions without regard to content (Brown and Smiley, 1977).

In general, story grammars describe the underlying structure of narrative texts in a manner similar to a transformational grammar for sentences. The grammar consists of a set of syntactic categories which form the deep structure for a story, and a set of semantic relation rules which relate syntactic categories to one another. The grammar used in the present study is a modification of Rumelhart (1975, 1977b) and Thorndyke (1977), and has been presented elsewhere (McConaughy, 1979, 1980a, b; McConaughy et al, in press). In brief, the grammar defines a story as a system of problem-solving episodes centering on the

main character's (or characters') efforts to achieve a major goal. The story then consists of a series of related attempts and outcomes which begin with an initiating event and eventually lead to a final resolution in which the main character does or does not achieve his goal.

Most of the story grammar research to date has focused attention on comprehension of "normal" children and adults. However, Weaver (1978) reviewed a small body of evidence which suggested that good and poor readers differ in their ability to organize story information according to some overall structure. For example, in a study of story organization abilities of Kindergarten children, deHirsch, Jansky and Langford (1966) found that one of the best predictors of second grade reading achievement was children's ability to organize and integrate stories into a meaningful whole. Lack of such ability in early years was related to lower levels of achievement later on. In addition, deHirsch's clinical descriptions of older poor readers (11 to 15 years) indicated they had difficulties in telling a coherent story. Fry, Johnson and Meuhl (1970) also showed poor second grade readers characteristically told stories based on picture sequences as a series of descriptive sentences which were not integrated into a cohesive story structure. In a more recent study of older children, Smiley, Oakley, Worthen, Campione and Brown (1977) compared good and poor seventh grade readers on their ability to recall information according to levels of importance to the central theme of a story. They found that poor readers were significantly less sensitive to gradients of importance than were good readers, and that they performed no better than first grade readers in a second study.

Subsequent to the Smiley et al. study, Dickinson and Weaver (in press) examined the story recall abilities of reading disabled boys ranging from nine to 15 years of age and compared them to Stein and Glenn's (1979) sample of normal fifth grade readers. They found that the poor readers seemed to have the same general knowledge of the underlying story schema as good readers, as described by the Stein and Glenn grammar. However, a more in-depth analysis of the protocols showed poor readers used a strategy of trying to recall the stories verbatim, and as a result made fewer inferences and produced less coherent stories in terms of causal and temporal organization of plot structure. Dickinson and Weaver concluded that the recall of poor readers showed a "flattening" of differences between centrally important categories similar to the finding of Smiley et al. (1977). Taken together, the results of the above studies suggest that poor readers' comprehension problems are related to an insensitivity to the relative importance of different information to the central theme and plot structure of the underlying story schema.

Schema Quality

The findings of previous studies led to the first question addressed in the present research. This was whether the story comprehension of poor readers is lower compared to good readers in terms of the quality of story schema represented, rather than simply the quantity of what is recalled. In order to describe schema quality, first it is necessary to consider the underlying structure of a story

from two different perspectives. From one perspective, we can focus on the story text and describe the organization of information inherent in the text itself. This type of analysis produces an ideal structure for a given story which can be described (or generated) by the story grammar. Taking a different perspective, we can focus on the reader or listener and describe the type of cognitive structure he/she brings to the text as a mental set for comprehension. This type of schema may or may not match the ideal structure described by the grammar.

Recent evidence from Mosenthal (1979) has shown that children's schemata for paragraphs do not necessarily match the ideal structure generated by text grammars, and that children's recall of such paragraphs improves when the text is thematically reorganized to match their own particular internal schema. Similarly, the present author has proposed that there are different types of internal story schemata which represent increasing levels of complexity for understanding information explicit or implicit in story texts (McConaughy, 1978a, 1980b, McConaughy et al., in press).

The highest level of complexity involves organizing the story information in terms of the motivation of the characters which leads to or connects the action and event sequence in the story. It also involves a literary structure in the sense of an overall theme, or major goal which ties together the beginning (initiating event) and ending (resolution) of the story. This type of high level schema is referred to as the social inference schema, drawing on other authors' descriptions of "psychological causality" (e.g., Bruce, 1980). The social inference schema matches the ideal story structure produced by the story grammar. The next lower level of complexity involves organizing information in terms of the plot structure for the actions and events without including the motivational elements. This type of schema would include the initiating event and resolution, but not the major goal of the character(s). This less complex level of comprehension is called a causal inference schema. It is so labelled because the focus is on physical causality, or what happened, without including why it happened. A still less complex type of organization would be a simple description of some of the actions and events in an "and-then" fashion, but leaving out the final event or resolution which ended the sequence. Lower levels of complexity could also be represented in the form of primacy or recency effects of memory, such as recalling only the first few propositions or only the last few propositions. Finally, the lowest level of complexity would be random recall of information with no recognizable pattern or major distortions of information which do not fit with the original content.

Support for the distinctions between different types of story schemata has been provided in previous research by the present author (McConaughy, 1979; 1980a, b; McConaughy et al, in press). In that research, eighty fifth grade children and eighty college students were presented one of four short stories to read. Subjects were then asked to write a short summary of the story from memory, telling only the general gist of the story and what they considered to be the most important parts for the overall meaning. After the summary, subjects re-examined the story and rank ordered the single propositions in the text according to their relative importance for the meaning of the story.

Both the content of the summaries and the rank order judgments on propositions showed significant differences between adults and fifth grade children in the types of information they considered to be most important in stories. As predicted, adults' summaries emphasized initiating events, goals, resolutions and inferred internal responses, thus matching the organization of the social inference schema. Children's summaries included a high proportion of initiating events and resolutions but significantly fewer goals and inferred internal responses, thus matching the organization of less complex causal inference schema. Judgments on important propositions by the two groups reflected similar differences in emphasis between the groups as shown in a strong "levels" effect found for adults contrasted to a sequence effect for children. These results provided validity for the hypothesis that there are different levels of complexity for story comprehension such that internal schemata do not always match the ideal structures created by story grammars.

Mode of Presentation and Recall

A second question addressed in the present research was whether poor readers' abilities to attend to important information would vary under the different receptive modalities of reading and listening and the expressive modalities of oral and written recall. The few studies discussed above which have addressed poor readers' abilities to comprehend story structure have involved different modalities for input and output of story material. In the Smiley et al. (1977) study, stories were presented under conditions involving listening and reading, and subjects were required to write their story protocols in both conditions. Thus it was not clear whether the difficulties of the poor readers represented a general comprehension problem involving only the receptive processes or also a problem with written expression. In the Dickinson and Weaver (in press) study, poor readers listened to the stories and orally retold them to the experimenters. Thus, it was not known whether their results would carry over to reading and written recall. Based on clinical experience, the present author suspected that poor readers would perform better during listening and oral recall but that their performance would deteriorate when reading and written expression was combined. Since a direct comparison of the different receptive and expressive modalities had not yet been done, it was made a major feature of the research design.

Surface Features

A final question in the present research was whether poor readers differed from good readers in terms of what will be labelled "surface features" of oral or written expression. Surface features had to do with the fluency with which a person might retell a story orally or the appearance of his/her written protocol. That is, the focus here was not on the content of ideas presented, but rather on the "mechanics" of oral or written expression. In the written protocols, surface features were analyzed in terms of the number of spelling errors, punctuation and capitalization errors, and the legibility of the handwriting. In the oral protocols, surface features were analyzed in terms of the number of

repetitions of words and phrases and other signs of confusion or difficulty, such as backing up or starting over, or commentaries on the memory process. Examination of surface features made it possible to compare good and poor readers on surface levels of oral and written expression as well as on deeper levels of comprehension evident in the content of what they remembered.

In summary, then, the research was designed to address three broad questions:

1. Do poor readers show a lower level of story comprehension than good readers in terms of schema quality?

2. Do poor readers show differences in the level of comprehension depending on the modality for presentation and recall?

3. Do poor readers show more difficulties than good readers in the surface features of oral and written expression?

In order to test the above questions, good and poor readers were asked to summarize important information from story texts under different modality conditions. The summaries were analyzed in a number of ways to determine the level of complexity in the organization of information represented as well as the presence of surface feature errors. Summarization was used, rather than exact recall, in order to encourage the children to select information according to its importance in the schema structure (McConaughy et al., in press; Rumelhart, 1977b) and to delete less important information. Summarization also tended to reduce any potential differences between good and poor readers in terms of the quantity of what was remembered.

Method

Subjects

Twenty-one poor readers and twenty-one good readers in sixth grade were selected from public middle schools in Chittenden County, Vermont. Good readers included students with reading comprehension scores at the 64th percentile or above based on standardized achievement tests given by their schools (either the Metropolitan Achievement Test or the California Test of Basic Skills). This percentile cut-off identified good readers as achieving at least one level above grade (7.2 GLE or higher). Poor readers included students with reading comprehension scores between the 26th and 40th percentile on the same standardized achievement tests. These cutoffs identified poor readers as achieving approximately two levels below grade (3.8 GLE to 4.9 GLE). There were 9 males and 12 females in the group of good readers and 8 males and 13 females in the group of poor readers. All the subjects were tested with Peabody Picture Vocabulary Test - Revised (1981) to obtain an estimate of verbal ability. The PPVT-R scores of all but one subject fell within the average range of ability or higher. The good readers had significantly higher scores on the PPVT-R ($\bar{X}$ = 118) than did the poor

readers ($\bar{X}$ = 89), $F(1, 38) = 43.36$ $p<.01$, but there were no differences between males and females.

Stimuli

Four short stories were used in the study. The stories were versions of those used in previous work by the author and other researchers with modifications to reduce the readability to the fourth grade level (Dale and Chall, 1948). All of the stories had animals as characters and involved a general theme having to do with eating or acquiring food. Each story was 118 words in length and contained at least one proposition for eight syntactic categories described in the story grammar. The stories were comparable in the total number of propositional units they contained (16-20). The structure for each story had been analyzed a priori according to the rules of the story grammar. An example of one of the stories is presented in Table 1 with syntactic categories labelled in the left column. The hierarchical levels for importance in the story structure are also indicated, proceeding from level 1 (most important) to level 5 (least important).

Insert Table 1 about here

Procedure

Students were tested individually in one forty-five minute session. Each student was presented all four stories and asked to summarize each from memory after the presentation. A different story was presented in each of four conditions: listening-oral recall; reading-oral recall; listening-written recall; reading-written recall. For the reading conditions, stories were presented as one paragraph with the same number of lines of type for each. For the listening conditions, students heard a tape-recorded version of the story read by the experimenter with no special emphasis on any one proposition. The order of presentation of conditions was counter-balanced across the subjects in each group to distribute any practice effects across all four conditions. The order of stories was counter-balanced across subjects as well.

Immediately after listening to or reading a story, students were instructed to summarize the story, telling only what they considered to be the "most important parts for the meaning of the story." They were told they did not have to retell the story exactly as it was written (or as they heard it), but they should be sure to include everything they thought was important. As in Thorndyke's (1977) procedure, no constraint on the length of the summaries was imposed and time was unlimited in both writing and oral recall. Oral summaries were tape-recorded and later transcribed for scoring. After each summary, the subject was asked if there was anything else he/she remembered from the story which was not included in the summary. The experimenter

recorded each additional memory verbatim. After the summarizing task was completed for all four stories, the subject was tested with the Peabody Picture Vocabulary Test - Revised.

Scoring Procedures

Content Analyses. The scoring procedures for content analyses of the summaries consisted of several steps developed in previous research (McConaughy, 1980a; McConaughy et al., in press). First, each summary protocol was parsed into single statements representing as closely as possible the gist of the original propositions in the text. A numbered version of the text was used as a standard for parsing. Statements which did not represent explicit text propositions were parsed as "thought units" representing possible inferences or distortions. A "thought unit" was defined as a statement with one subject and verb phrase. The parsing task was completed by two raters with 96 percent agreement. Disagreements were discussed and resolved by the investigator and one rater. Second, errors in spelling and punctuation and capitalization were corrected to prevent possible bias against poor readers. Repetitions, incomplete statements and commentaries (occurring primarily in oral summaries) were deleted to prevent bias in modality effects. The parsed and corrected protocols were typed individually and then scored by two raters who were blind to the subjects' sex, group assignment and modality condition. The parsed propositional elements were numbered for scoring and the order of scoring was randomized for each story across reader groups.

Raters scored each statement in the typed summaries for the closest match to the general gist of single propositions in the original story text. The scored statements were later classified into eight syntactic categories as defined by the story grammar. These were settings, initiating events, major goals, internal responses, attempts, outcomes, final events in the resolutions and reactions.

If a statement could not be identified as one of the propositions in the story text, it was scored in one of eight additional categories. These included generalized "try" statements, six types of inferences, and major distortions. A "try" statement was defined as a summary statement which condensed the initiating event and goal of the story into one general statement similar to Rumelhart's (1977b) definition, (e.g., "the crane tried to remove the bone"). Inferences were defined as any new information which was not explicitly stated in the text of the story. These included statements representing the syntactic categories of internal responses, attempts, outcomes and reactions, as well as categories for dispositions or traits of characters, (e.g., "trickiness" of the wolf), and any morals added to the story. Major distortions were defined as any statement which did not logically fit in the story line. A scoring manual for the content analyses of summary protocols had already been developed and tested in previous work (McConaughy, 1980a) with a high interrater reliability (89% agreement). This scoring manual was revised slightly to match modifications in the present stories.[2] Disagreements between raters were resolved by the investigator acting as a third rater blind to the previous scores. The interrater reliability on the content analyses was 87 percent.

Surface Features. The original summary protocols were scored for several dimensions related to what has been labelled "surface features." Both oral and written protocols were scored for the presence of repetitions and commentaries. Repetitions included repeated single words or phrases and incomplete thoughts. They also included any statement which had been previously scored as representing the same text proposition as another statement in a given summary. Commentaries consisted of subjects' remarks on the memory process or the text, such as saying "I forgot that part" or "What was the character's name?" Strings of repetitions or commentaries were counted only once within or between each parsing unit.

The original written protocols were also scored for spelling errors and punctuation and capitalization errors and they were rated for legibility. The score for spelling errors included the number of different words misspelled and grammatical mistakes in subject-verb agreement (e.g. he like rice crispys). The score for punctuation and capitalization errors included only non-adjacent errors. For example, a missing period and failure to capitalize the first letter of the next sentence was counted as one error. This represented the majority of errors in the punctuation and capitalization. Missing quotation marks were also counted at the beginning and ending of sentences. Errors in the use of commas were not counted. The legibility of original written protocols was rated on a five point scale from very good to very poor. Printed protocols were rated separately from protocols written in cursive. The rater sorted the protocols into five groups in which the middle or average score (3) represented the largest proportion and thus served as a standard for assigning the other four scores. All of the above analyses were performed by one rater who was blind to the subjects' group assignment and sex.

Results

The results will be presented under two major headings: content analyses and surface features, each comparing group differences and modality differences. The content analyses were designed to examine the quality of story schemata represented in the summaries. These included: first, examining the proportion of statements which represented the eight syntactic categories defined by the grammar; second, examining the number of "try" statements and inferences added to the summaries; and third, examining the proportion of statements which represented different hierarchical levels of importance as defined by the story structures. The analyses of surface features were designed to measure indices of memory processing difficulties or difficulties in the "mechanics" of oral and written expression as described in the procedures.

There were no significant sex differences found on any of the above analyses, with the exception of the legibility rating. Therefore, scores for males and females were collapsed in all but the analyses of legibility rating. It should also be noted that there were very few, if any, distortions of information produced by either good readers ($\bar{X}$ = .05) or poor readers ($\bar{X}$ = .16), indicating that the general accuracy of

their recall was high. Finally, there were very few additional memories reported by the subjects after they gave their summaries, suggesting that they did try to include everything they remembered as important as instructed. As a result, no analyses were performed on probes for additional memories.

Content Analyses

Syntactic categories. The single statements in each summary representing text propositions were classified into the eight syntactic categories identified in the section on scoring procedures. The number of statements representing each category was calculated for each subject. This score was then expressed as a proportion by dividing the number of statements in a given category by the number of propositions in that category in the story text, since the number of propositions in each category varied across stories.

A 2x4x8 mixed analysis of variance was applied to the proportion scores, treating group as a between-subject measure and modality and syntactic category as repeated measures. The results showed that good readers, on average, produced longer summaries than poor readers, $F(1,40) = 6.86$, $p < .01$. The oral modalities also resulted in longer summaries than the written modalities for both groups, $F(3,120) = 2.75$, $p < .05$, though subsequent Newman-Keuls comparisons were not powerful enough to detect differences among modalities individually. There was no group by mode interaction, indicating that the modality effects were the same for both good and poor readers.

These general effects can be seen in the first row of figures in Table 2. The table summarizes the means and standard deviations for the proportion of explicit text propositions and the number of additions (try statements and inferences) in the summaries of the two groups across the four modalities. The data for additions will be discussed shortly.

Insert Table 2 about here

The proportions of different summary statements in each syntactic category was also part of the analysis of variance. These proportions are shown in Figure 1 for each of the eight syntactic categories for good and poor readers. A separate figure is presented for each of the four modality conditions.

Insert Figure 1 about here

A main effect was found for syntactic categories, indicating that the two groups of readers did emphasize certain types of information over others, $F(7,280) = 29.91$, $p < .001$. Newman-Keuls comparisons were performed among syntactic categories collapsed across groups and modalities. The results indicated that there were significantly higher proportions of statements representing settings (S), initiating events (IE), major goals (G), outcomes (O), and resolutions (R) as compared to attempts (A), internal responses (IR), and reactions (REA), $p < .05$. With the exception of settings, this finding is remarkably consistent with that found for adult subjects in the investigator's previous research (McConaughy, 1980a; McConaughy et al., in press). The pattern of results represents what has been called a higher level "social inference schema," which includes the beginnings and endings and the major goals of the protagonists.

A surprising finding, however, was the lack of any significant group by category interaction or three way interaction with modality. The similarities in category and modality effects can be seen clearly in Figure 1 in the way the general pattern of relative proportions was consistent across categories for both good and poor readers. This consistency held up across all four modality conditions. These results were contrary to original predictions and a positive indication of a high level of story comprehension for poor readers as well as good readers.

Additions. The number of additional statements in the summary protocols was calculated for generalized "try" statements and six types of inferences as defined in the scoring procedures. A 2x4x7 mixed analysis of variance was applied to the frequency scores, treating reader group as a between-subject measure and modality and addition type as repeated measures.

There was a significant main effect of modality, indicating that the listening-oral condition produced significantly more inferences overall, $F(3,120) = 1.70$, $p < .05$, though Newman-Keuls comparisons were not powerful enough to detect differences among modalities individually. Surprisingly, the results showed no differences between good and poor readers in the total number of additions and no interaction of group with modality and/or addition type. These findings were again contrary to the original predictions and indicated poor readers' inferential level of story comprehension was comparable to that of good readers and not affected by modality. The similarity of the two groups in the mean number of additions can be seen in the second row of figures in Table 2.

The results did show a significant main effect in the type of addition produced by both groups, $F(6,240) = 19.79$, $p < .001$. Newman-Keuls comparisons ($p < .05$), collapsed across modality and group,

showed that there were significantly greater numbers of inferred attempts than any other category. The second highest numbers of additions were "try" statements, inferred internal responses and inferred outcomes which represented a homogenous group. The lowest numbers of additions were inferred reactions, morals, and dispositions, and this group overlapped with the number of inferred outcomes in the multiple range comparisons. These findings suggested that the inferential comprehension of the stories for both reader groups was closer to the level of what has been labelled the "causal inference schema," which emphasizes actions more than motivation for actions. The lack of an interaction of addition type with modality indicated this pattern held over all conditions. Figure 2 shows the mean number of each type of addition for the two reader groups collapsed across modalities. The figure shows how the pattern of inferential comprehension was similar for both good and poor readers.

Insert Figure 2 about here.

Hierarchical levels. The location of text propositions at different hierarchical levels was determined a priori by constructing the diagrams for each story based on the story grammar. The structures had also been validated by proposition rankings in previous research (McConaughy, 1980a). As explained earlier, the hierarchical levels represent an ordering of importance for the different propositions in a story. To analyze levels effects, each statement in a subject's summary protocol was assigned a hierarchical level matching the level of the proposition it represented. The number of statements within each hierarchical level was calculated for each subject. This score was then expressed as a proportion by dividing the number of statements by the number of text propositions at each level. The proportion scores were then combined across subjects for three different level categories because of the small number of propositions at intermediate and lower levels in some stories. Statements representing settings were also kept separate because settings are not considered part of the episode system in the grammar. Figure 3 shows the mean proportions of summary statements for settings and three hierarchical levels for good and poor readers collapsed across modalities.

Insert Figure 3 about here

A 2x4x4 mixed analysis of variance was applied to the proportion scores treating reader group as a between-subject variable and modality and levels (plus setting) as repeated measures. As can be seen in the

figure, both good and poor readers showed significant levels effects, $F(3,120) = 35.08$, $p < .001$. Newman-Keuls comparisons, collapsed across group and modality showed significantly higher proportions of statements for settings and highest level propositions as compared to intermediate levels, and intermediate level statements were, in turn, significantly higher in proportion to lowest level statements. This powerful levels effect indicated both good and poor readers were able to pick out the most important propositions for their summaries and to delete less important propositions. This was predicted for good readers, but not for poor readers, and is another indication of the high quality story comprehension found for poor readers. The analysis of variance also showed significant main effects for group and modality, which simply reflected earlier findings of longer summaries produced by good readers overall and longer summaries produced in the listening-oral condition. The lack of significant group interactions confirmed the similarities between the two reader groups as shown in the figure.

Story Effects. In addition to the three major analyses described above, separate mixed analyses of variance were applied to examine the effects of story content on the comprehension patterns produced for syntactic categories, additions, and hierarchical levels. In these analyses, story was substituted as a repeated measure in place of the four modality conditions and reader group continued to be treated as a between-subject measure. In general, the results showed that there were significant interactions with story in the types of comprehension patterns produced. This was to be expected because the content of the four stories was not intended to be equivalent. Nonetheless, there were no group by story interactions in any of the analyses, indicating that both good and poor readers summarized the individual stories in the same general way.

More specifically, the analyses for story effects showed that certain stories produced longer summaries of text propositions than others, $F(3,120) = 2.74$, $p < .05$, but there was no significant story effect on the number of additions. With regard to syntactic categories, a significant story by category interaction $F(21,840) = 7.40$, $p < .001$, reflected the finding that one story produced fewer recalled internal responses than the others and another produced relatively fewer recalled reactions. Two stories also differed on the proportion of initiating events. However, the overall pattern of the category effects continued to represent the social inference schema for all four stories. With regard to additions, a significant story by addition interaction, $F(18,720) = 1.92$, $p < .001$, indicated that the stories differed with respect to the frequency of inferred internal responses and "try" statements. Nonetheless, inferred attempts represented the highest frequency of additions for all four stories, thus showing a similarity in inferential comprehension at the level of the causal inference schema. Finally, a significant interaction of story with hierarchical level, $F(9,360) = 1.85$, $p < .01$, reflected the finding that two stories showed full levels effects by differentiating all three level categories, whereas one story showed a partial levels effect and one story showed no levels effects. The latter finding indicates that the individual stories produce different effects in readers' sensitivity to levels of importance of propositions. Again, however, the stories produced the same differential effects for both good and poor readers.

Surface Features

As described in the method section, surface features were analyzed by examining original protocols for the number of repetitions, spelling errors, punctuation and capitalization errors and the legibility of handwriting. The overall results are presented in Table 3 in terms of group means and standard deviations across the four modality conditions. As can be seen in the table, repetitions and commentaries were analyzed for all four modalities whereas spelling errors, punctuation and capitalization errors and legibility ratings were appropriate only for conditions involving written recall.

Insert Table 3 about here

Separate mixed analyses of variance were applied to each set of surface feature data. The results showed no significant differences between good and poor readers on the number of repetitions and commentaries, punctuation and capitalization errors or legibility of handwriting. There were significant differences between good and poor readers on spelling errors, with poor readers showing significantly more errors $F(1,40) = 8.44$, $p < .01$. The overall results were contrary to expectations, since it was predicted that poor readers would show more difficulty in both memory processing as indicated by repetitions and commentaries, and in the "mechanics" of written expression. The results indicated, however, that the only area where such problems did occur was in spelling. This suggested a more specific problem at the word level for poor readers rather than more general problems in linguistic output processes. It was also interesting that there were no differences in any of the analyses of written protocols due to listening vs. reading as the mode of input. There were significant differences due to output modality for repetitions and commentaries with oral recall producing higher frequencies of repetitions and commentaries than written recall, $F(3,120) = 44.43$, $p < .001$, as can be seen by inspection of the means. Finally, as mentioned earlier, the only area where there were any sex effects was in the legibility ratings, where females received significantly better ratings than males, $F(1,38) = 4.40$, $p < .05$, thus confirming a commonly held view of parents and teachers.

Discussion

Summary Content

The results from this research are interesting and surprising in many ways, since they run contrary to much of what was expected based on previous findings. It was predicted that good readers would produce equally good comprehension of story structure in all modality combinations of listening and reading and oral and written recall. This

was found to be the case in terms of the content of their story summaries and in the appearance or "surface features" of their oral and written protocols. What was surprising was the finding that poor readers' comprehension, as a group, was equivalent to that of good readers. This was the case in all of the various analyses of the content of the story summaries. Poor readers were not significantly different from good readers in their quality of story schema, their use of inference or their ability to summarize information on the basis of importance in the story structure, the latter referred to as a "levels effect." These findings on comprehension lead one to question whether children labelled as "poor readers" in the middle grades are actually capable of better comprehension than what is measured by school achievement tests. The results strongly suggest that when these "poor readers" are presented with text material which is from a familiar genre and which has a predictable underlying structure, such as narrative stories, they are capable of high quality comprehension.

What is most interesting in the present results is the finding that the same patterns of story comprehension persisted in spite of large differences between the two groups of subjects in estimated verbal ability (as measured on a receptive vocabulary test). A high quality of comprehension also held up regardless of variations in modality combinations for input and output, which is contrary to traditional literature on learning disabilities (e.g. Koppitz, 1977; Lerner, 1981). (Of course, it was essential that "poor readers" were able to read the words in the text, which was a factor controlled for by readability level of the stories.) This evidence adds reader ability as a new dimension to Stein and Trabasso's (1982) argument that story comprehension patterns have proved to be a robust and stable finding across a variety of experimental manipulations involving subjects of different ages and variations in task demands. Whaley (1981) also demonstrated that good readers' expectations for story structure are generally consistent with story grammar analyses, especially at sixth grade level and beyond. The present study further suggests that such expectations will remain consistent for sixth grade poor readers as well as good readers. What is not clear is whether the same consistencies will hold up between good and poor readers at earlier grade levels. This remains a question for future research.

The results of the study also continue to support the notion that there are different levels of complexity for comprehension of story structure. The study examined the comprehension patterns of sixth grade students because previous research suggested that this might represent a transitional age range for the level of story schema complexity (see McConaughy et al., in press). The various analyses on the quality of story schema showed differences in schema complexity depending on whether information was explicit or implicit in text material. That is, the content of good and poor readers' summaries of explicitly stated propositions on average represented the social inference schema, which was considered the highest level of complexity. This summary pattern was similar to adults in the previous study (McConaughy, et al., in press). The pattern of inferences in information added to the summaries, however, more closely represented the causal inference schema, which is considered an intermediate level of complexity. Thus, the results support the general notion of variations in story schema

complexity and suggest there is a relationship between levels of comprehension and text difficulty in terms of explicit vs. implicit information as argued by McConaughy (1982).

The results of the study do not rule out the possibility that poor readers may show significant comprehension problems when they are presented with texts which are more difficult because of content and/or complexity in structure. For example, Freedman (1980) provided evidence that certain types of expository texts, namely argumentative texts, were more difficult to comprehend than narrative stories for poor readers. Other authors have described a variety of expository text structures which vary in complexity and which presumably could vary in how difficult they are to comprehend (Anderson, 1978; Tierney and Mosenthal, 1982). It is also possible that reader differences would emerge when narrative stories themselves are made more complex in content and/or structure. This could be accomplished in a variety of ways, such as making plans and beliefs of characters conflict (Bruce, 1978, 1981a), making motives of characters ambiguous or discrepant with consequences (Stein and Trabasso, 1982), shifting points of view and creating different types of conflict (Steinberg and Bruce, 1980), creating embedded levels of rhetorical structure in author-reader relationships (Bruce, 1981b), and manipulating canonical structure to create different affective responses (Brewer and Lichenstein, in press). Finally, an overriding consideration in all of the latter variations in stories would be the background knowledge required from the reader regarding vocabulary, story content and story structure (Adams and Bruce, 1982).

Considering simple stories in context with more complex text structures leads to the possibility that simple narrative could be viewed as a sort of baseline level along a continuum of schema complexity required for comprehension. Differences between reader groups may then become more marked as the level of complexity increases. If this were the case, then the present results are optimistic ones in the sense that they demonstrate that simple narrative stories are a good genre with which to begin in teaching poor readers in order to develop schemata for more complex materials later on.

Surface Features

The consideration of surface aspects of oral and written recall produced equally surprising results as did consideration of quality of content. When differences in schema quality did not occur, it was hypothesized that the information processing problems of poor readers might emerge in terms of repetitions and commentaries in oral and written recall or in various types of spelling, punctuation and capitalization errors and the legibility of their written work. No specific measures of syntactic errors were conducted because examination of the protocols revealed very few errors among the entire group and the few errors which did exist were picked up in analyses of spelling. Contrary to prediction, poor readers, as a group, did not appear to have unusual difficulties in most of the aspects of verbal expression as might have been expected for learning disabled students.

The one area which did distinguish poor readers from good readers was a significant number of spelling errors. This is indicative of a type of verbal deficiency but it is of a different nature from comprehension deficits or reading disabilities per se. The high rate of spelling errors suggests problems in either auditory or visual pattern analysis of single words, or auditory and visual integration problems, and it may be a residual effect from earlier, more global, reading problems. It is important to note, however, that the number of spelling errors was not related to the quality of comprehension or the modality of input (reading or listening). Spelling errors are, nonetheless, a very salient feature of a student's writing and a frequent target of teachers' corrections on student papers. Thus, it would be quite interesting to examine the degree to which such spelling errors influence teachers' judgments of the quality of comprehension. An additional factor to consider in the same context would be the influence of the label "poor reader" combined with a high rate of spelling errors. A follow-up study of this nature is being conducted by the present author.

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Footnotes

1 Technically, according to the story grammar, the resolution includes both the final events or consequences of the story and the reaction to the final events. However, for the sake of simplicity in labeling, the term "resolution" has been used here to refer only to the final events of the story and the "reaction" is labelled as a separate category.

2 The revised scoring manual is available on request.

Table 1

Text of The Wolf and the Crane

Hierarchical Level	Syntactic Category	Story Text
0	setting	1. Once a wolf was eating an animal
0	setting	2. he had killed.
1	initiating event	3. Suddenly, a bone stuck in his throat.
2	internal response	4. He soon felt terrible pain
3	attempt	5. and ran up and down,
3	attempt	6. calling as loudly as he could.
1	goal	7. He wanted someone to remove the bone
3	attempt	8. and promised a reward
3	outcome	9. At last a crane agreed to try.
5	attempt	10. He told the wolf to open his jaws very wide.
4	attempt	11. The crane put his long neck down the wolf's throat.
4	outcome	12. and with his beak loosened the bone
3	outcome	13. till at last he got it out.
2	outcome	14. The crane asked for his reward.
1	resolution	15. The wolf grinned and said:
1	reaction	16. "Be happy.
1	resolution	17. You have put your head inside a wolf's mouth
1	resolution	18. and taken it out again in safety.
1	resolution	19. That is enough reward for you."

Table 2

Means and Standard Deviations for Proportion of Text Propositions and Number of Additions for Good and Poor Readers Across Four Modalities[a]

	Modality Conditions							
	Listening-Oral		Reading-Oral		Listening-Written		Reading-Written	
Summary Content	Good Readers	Poor Readers	Good Readers	Poor Readers	Good Readers	Poor Readers	Good Readers	Poor Readers
Proportions of Text Propositions[b]	.63 (.37)	.57 (.37)	.67 (.39)	.56 (.39)	.60 (.35)	.51 (.41)	.58 (.38)	.49 (.37)
Number of Additions (Try statements and Inferences)	.16 (.36)	.14 (.30)	.08 (.19)	.12 (.22)	.08 (.23)	.09 (.25)	.05 (.18)	.12 (.21)

[a] Numbers in parentheses are standard deviations

[b] $p < .05$ for difference of group means between good and poor readers

Table 3

Means and Standard Deviations for Surface Feature Errors and Legibility Ratings for Good and Poor Readers Across Four Modality Conditions[a]

	Modality Conditions							
	Listening-Oral		Reading-Oral		Listening-Written		Reading-Written	
Surface Features	Good Readers	Poor Readers	Good Readers	Poor Readers	Good Readers	Poor Readers	Good Readers	Poor Readers
Repetitions and Commentaries	1.90 (1.75)	3.14 (2.10)	1.14 (1.84)	1.90 (1.97)	0.33 (0.73)	0.19 (0.40)	0.19 (0.40)	0.19 (0.40)
Spelling errors[b]	----	----	----	----	1.05 (2.31)	3.90 (3.08)	1.71 (2.00)	4.33 (3.45)
Punctuation and Capitalization errors	----	----	----	----	1.81 (2.25)	1.81 (1.34)	1.10 (1.34)	1.95 (2.11)
Legibility rating for handwriting	----	----	----	----	2.85 (1.12)	3.16 (1.01)	2.85 (1.12)	3.16 (1.01)

[a] Numbers in parentheses are standard deviations

[b] $p < .05$ for difference of group means between good and poor readers

[c] Rating scale: 1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor

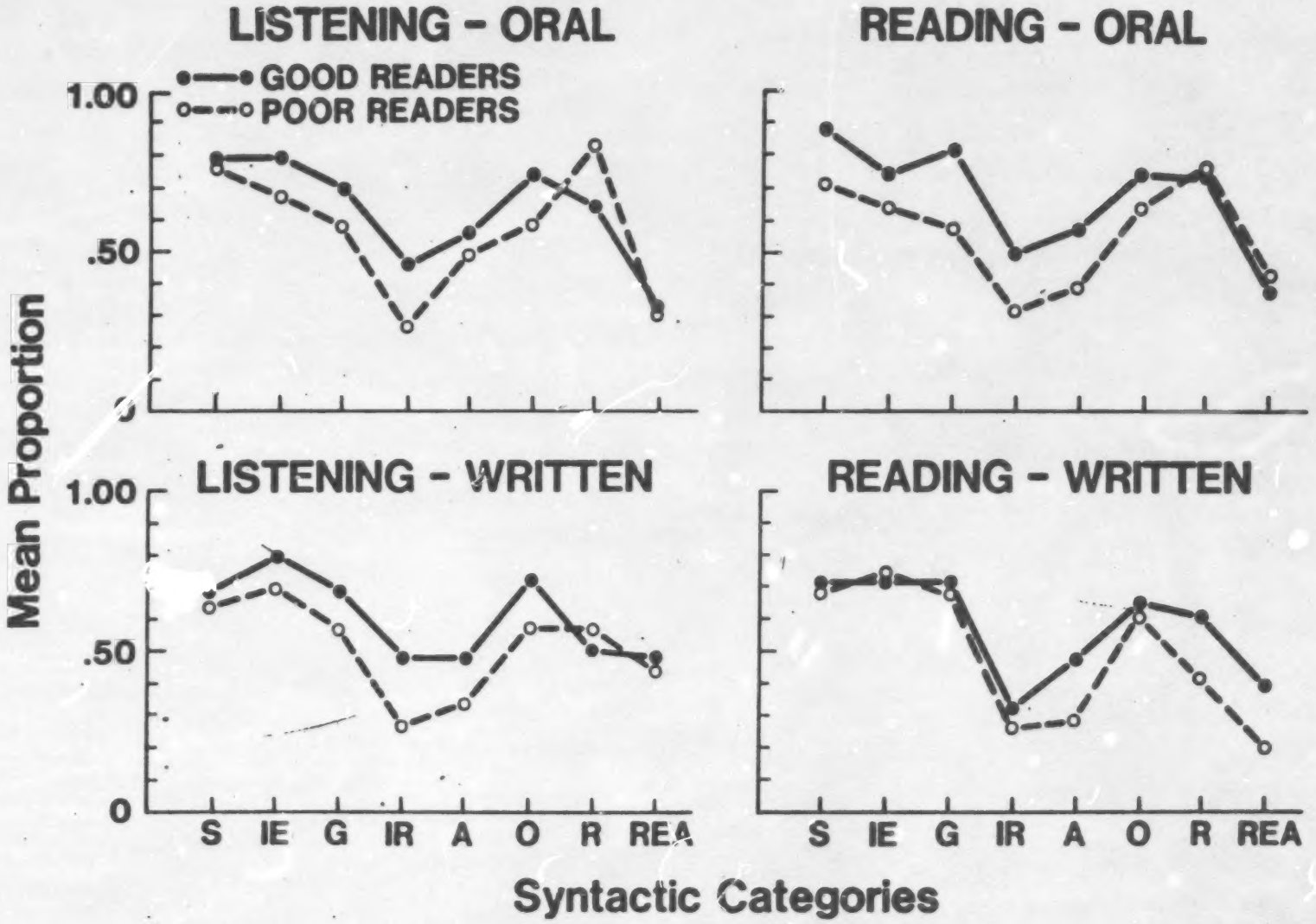


Figure 1. Mean proportion of summary statements for eight syntactic categories for good and poor readers across four modalities.

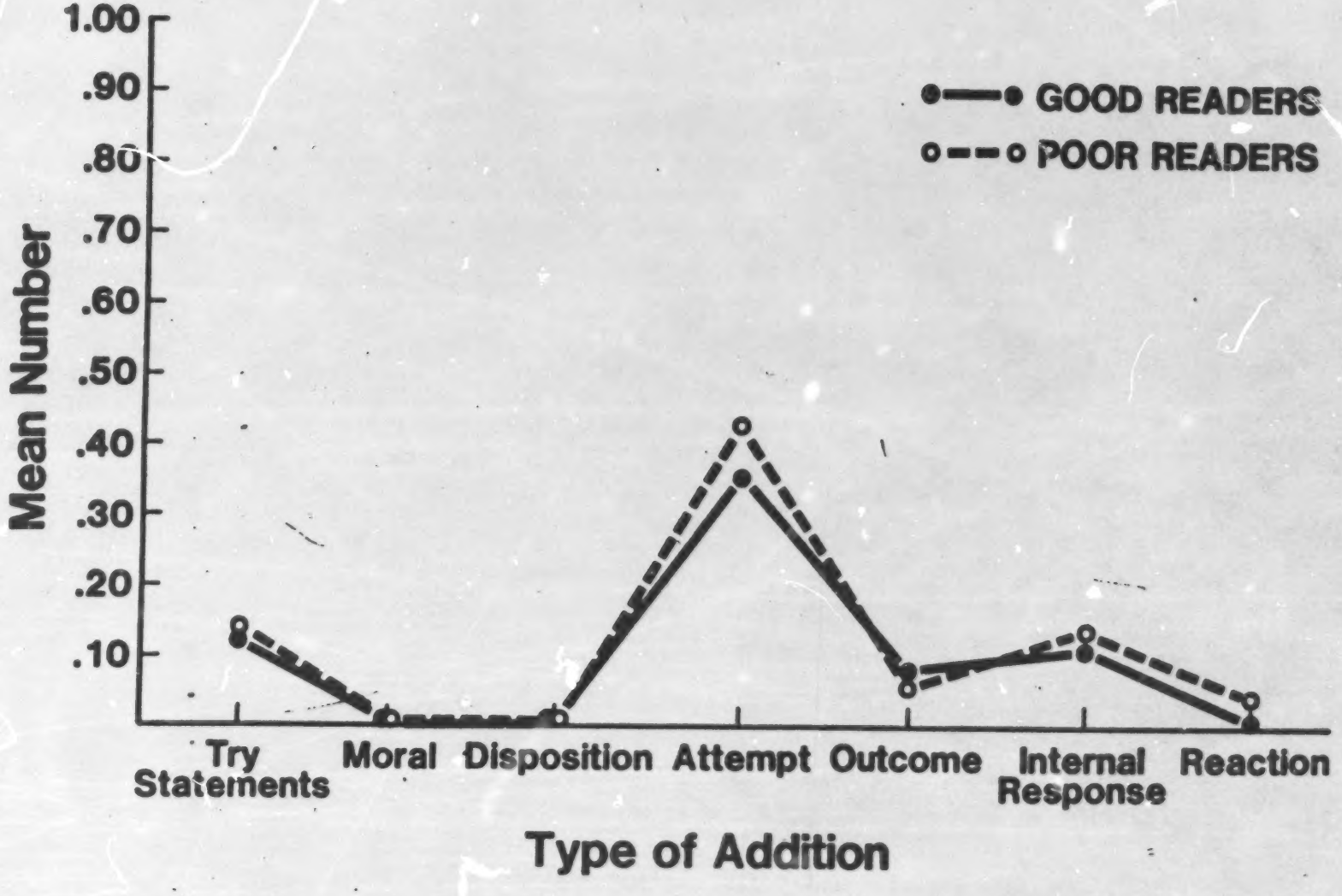


Figure 2. Mean number of additions per summary for good and poor readers.

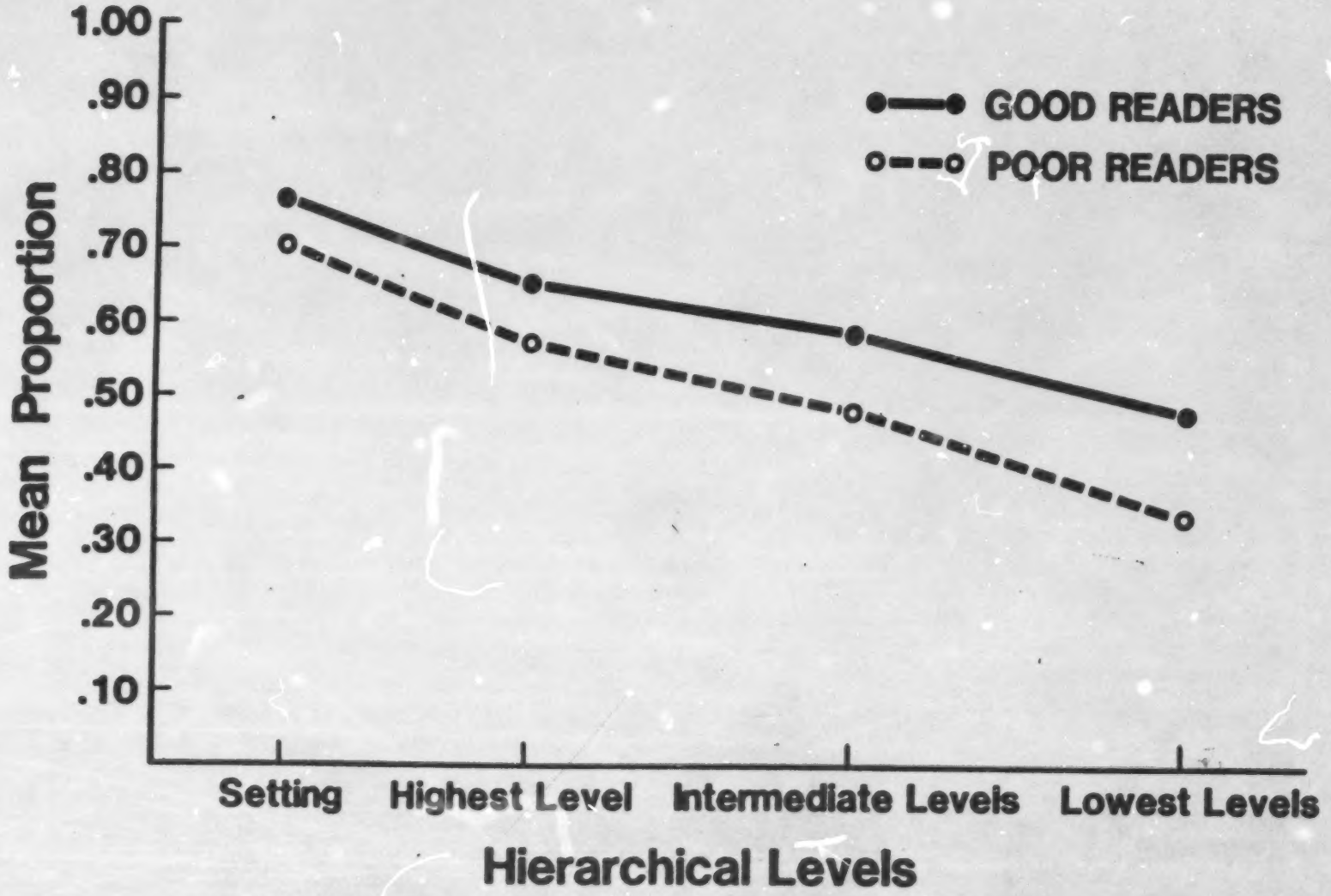


Figure 3. Mean proportion of summary statements for settings and three hierarchical levels for good and poor readers.

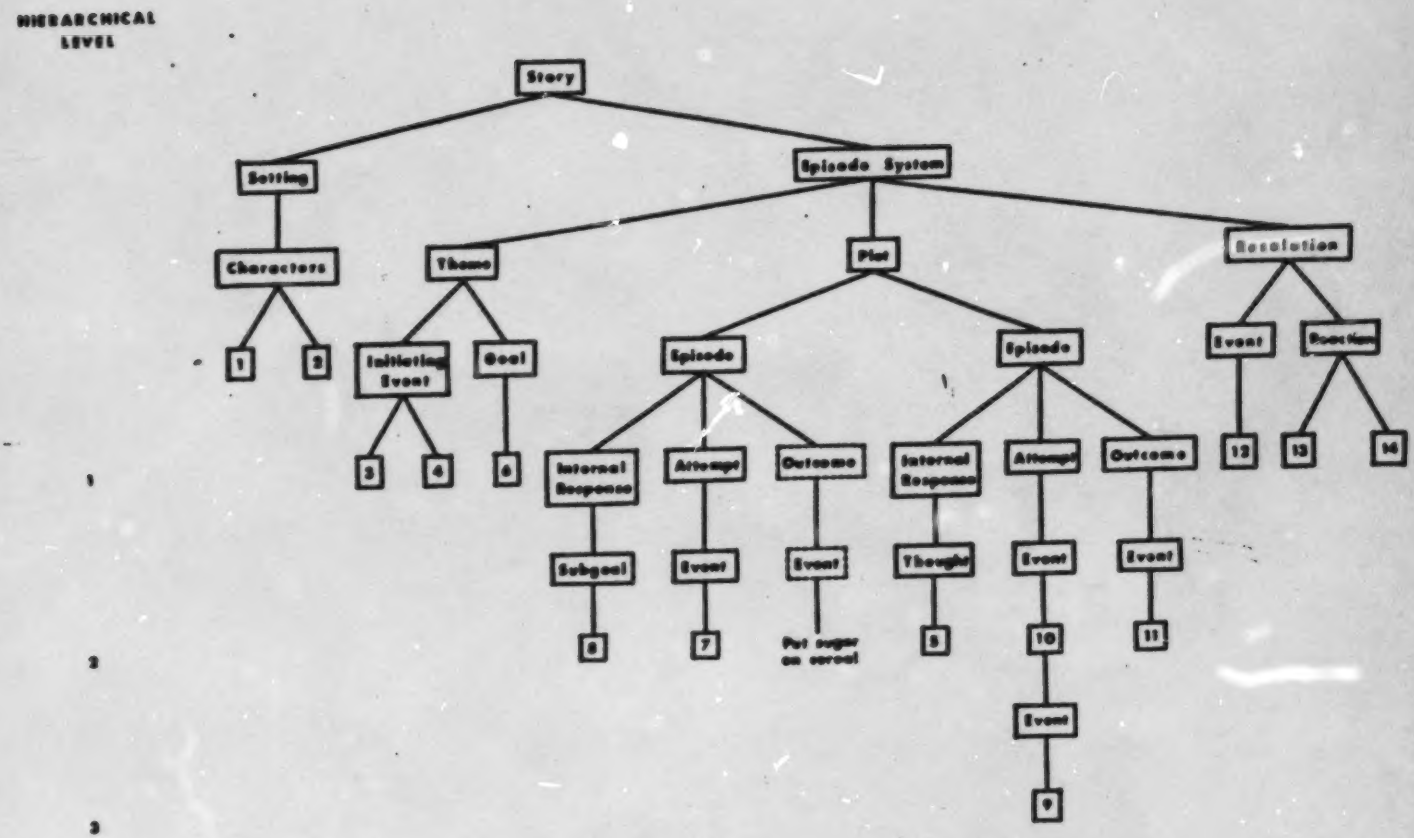
Appendix

Story Texts and Story Structures for All Four Stories Used as Stimuli:

1. Melvin, the Mouse
2. The Dog and his Shadow
3. The Fox and the Bear
4. The Wolf and the Crane (Text Presented in Table 1)

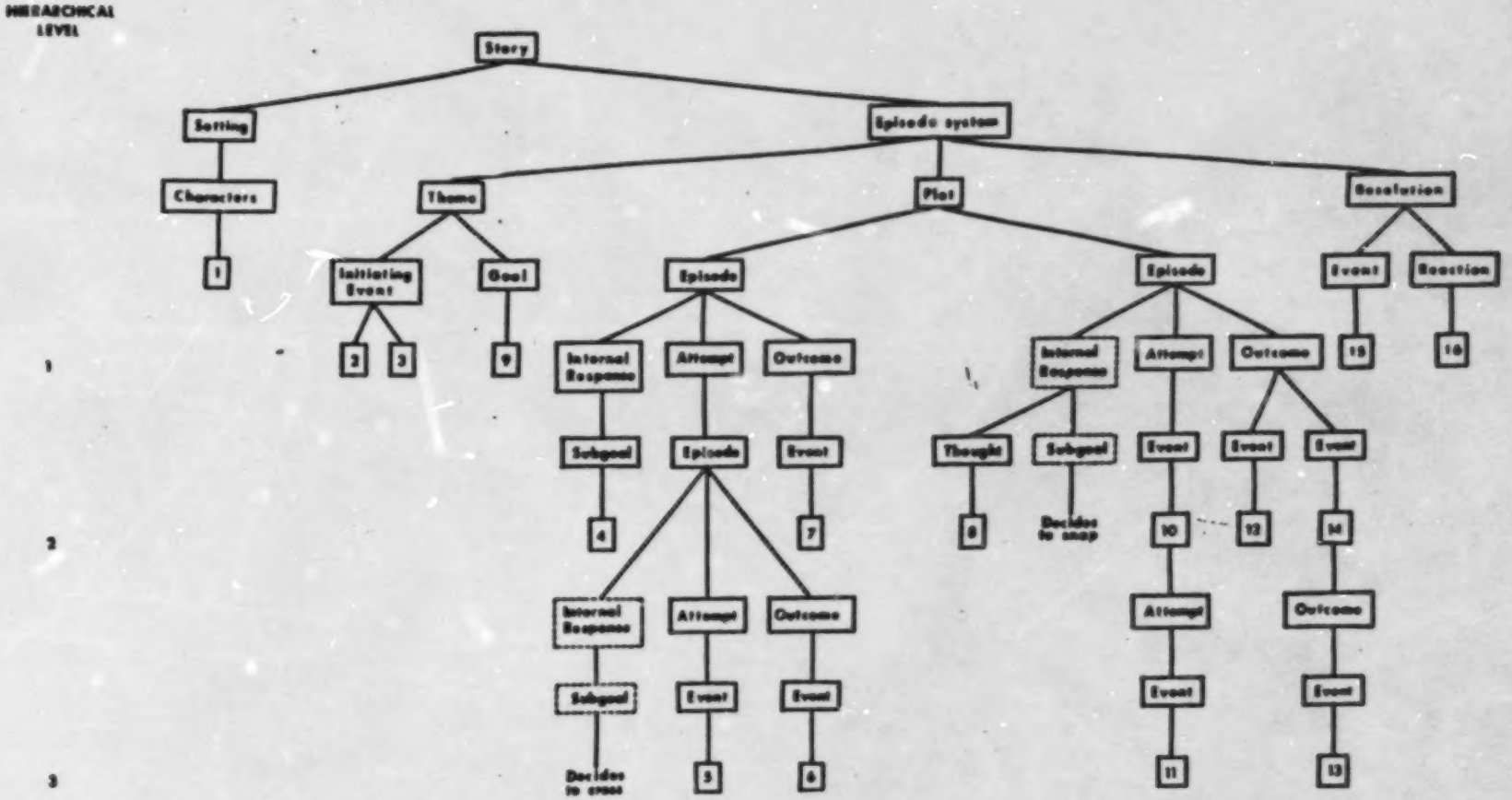
Melvin, the Mouse

Category	Story Text
setting	1. Once upon a time, there was a skinny little mouse named Melvin
setting	2. who lived in a big red barn.
initiating event	3. One day, Melvin found a box of rice crispies underneath a stack of hay.
initiating event	4. Then he saw a small hole in the side of the box.
internal response	5. Melvin knew how good the cereal tasted
goal	6. and he wanted to eat just a little bit of the cereal.
attempt	7. He went to get some sugar first
internal response	8. so that he could sweeten his cereal.
attempt	9. Then Melvin slipped through the hole in the box
attempt	10. and quickly filled his cereal bowl.
(last) outcome	11. Soon Melvin had eaten every bit of the rice crispies
resolution	12. and had become very full.
reaction	13. Melvin knew he had eaten too much
reaction	14. and felt very sad.


HIERARCHICAL LEVEL
Story
Setting
Episode System
Characters
Theme
Plot
Resolution
1
2
Initiating Event
Goal
Episode
Episode
Event
Reaction
3
4
6
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
12
13
14
Subgoal
Event
Event
Thought
Event
Event
8
7
Put sugar on cereal
5
10
11
Event
9
3

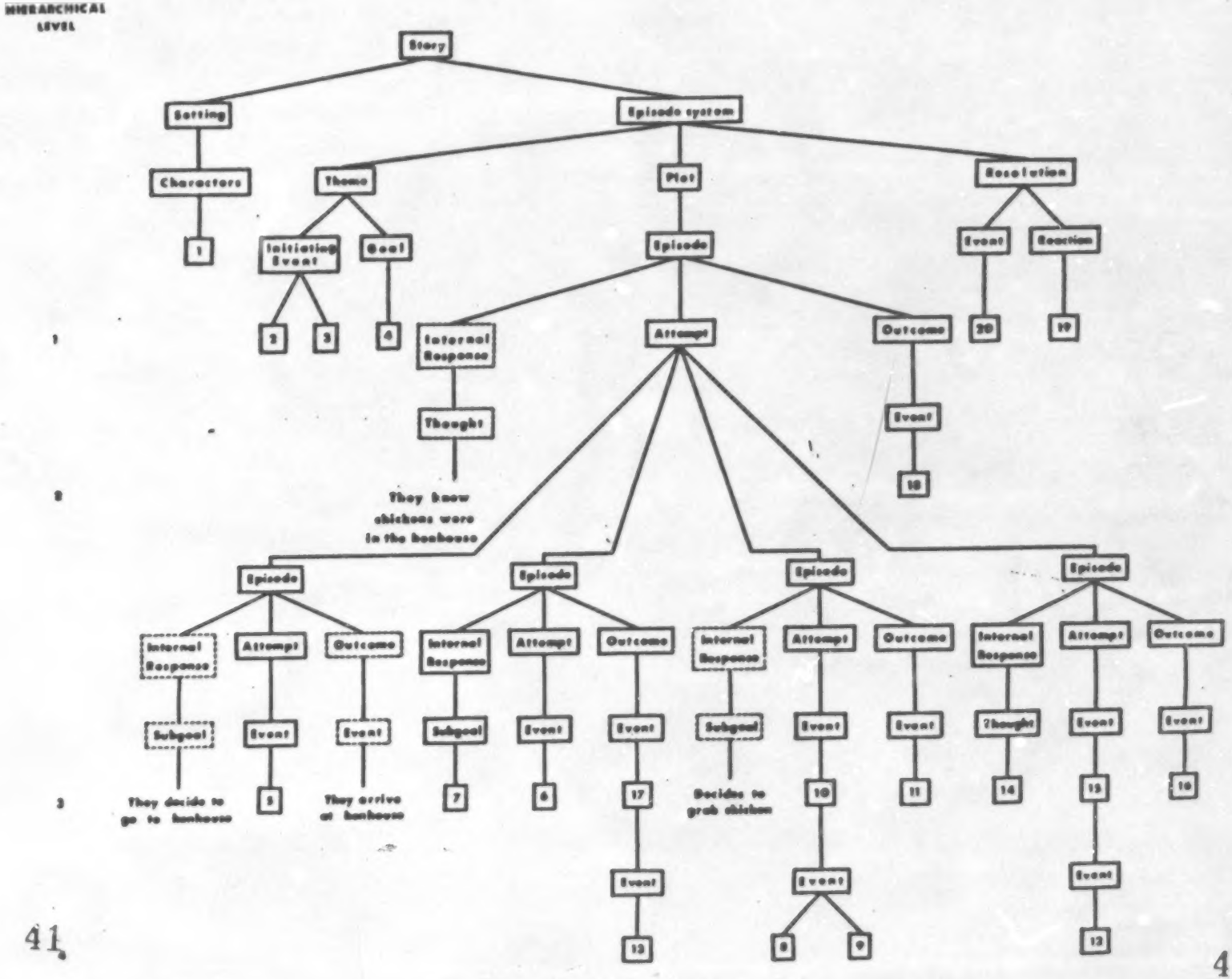
The Dog and His Shadow

Category	Story Text
setting	1. Once there was a dog named Sam.
initiating event	2. One day, Sam found a piece of meat
initiating event	3. and was carrying it home in his mouth to eat.
internal response	4. Now along the way, he had to cross over a plank lying across a running brook.
attempt	5. As he crossed the brook,
outcome	6. he looked down,
outcome	7. and saw his own shadow reflected in the water beneath.
internal response	8. He thought it was another dog with another piece of meat,
goal	9. and he made up his mind to have that piece also.
attempt	10. So he made a snap at the shadow,
attempt	11. but as he opened his mouth
outcome	12. the piece of meat fell out,
outcome	13. dropped into the water,
(last) outcome	14. and floated away.
resolution	15. Sam never saw the meat again,
reaction	16. and was very sad.


HIERARCHICAL LEVEL
Story
Setting
Episode system
Characters
Theme
Plot
Resolution
1
Initiating Event
Goal
Episode
Episode
Event
Reaction
2
3
9
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
15
16
Subgoal
Episode
Event
Thought
Subgoal
Event
Event
Event
4
7
8
10
12
14
Internal Response
Attempt
Outcome
Attempt
Outcome
Subgoal
Event
Event
Event
Event
5
6
11
13
1
2
3

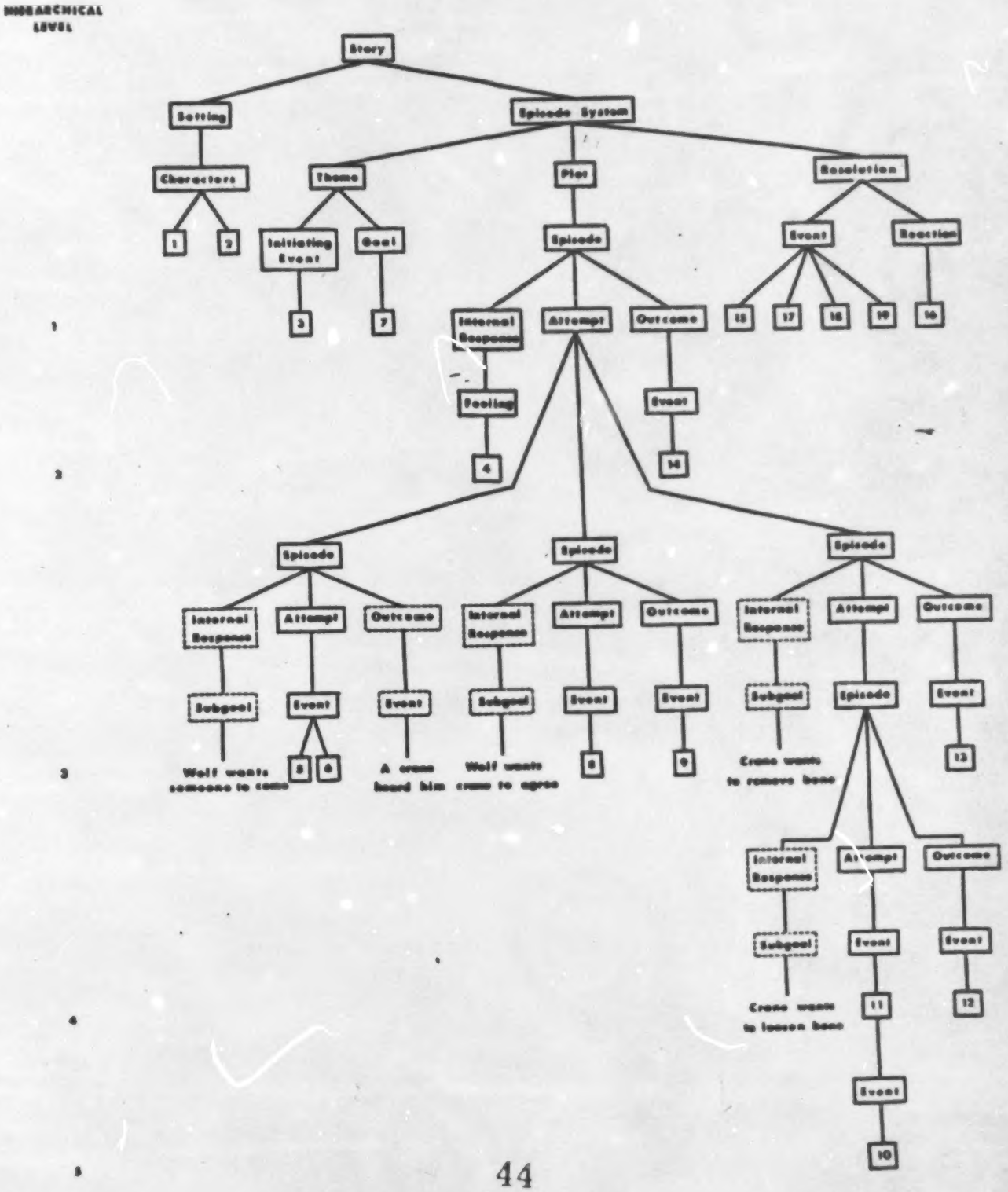
The Fox and the Bear

Category	Story Text
setting	1. Once there were a fox and a bear.
initiating event	2. One day, as they were walking together,
initiating event	3. they saw a nearby henhouse.
goal	4. So they decided to catch a chicken for supper.
attempt	5. They quickly snuck over to the henhouse.
attempt	6. The bear climbed up on the roof
internal response	7. to watch.
attempt	8. The fox opened the door
attempt	9. and crept inside
attempt	10. He grabbed a nice fat chicken
outcome	11. and killed it.
attempt	12. As he was carrying it out of the henhouse,
outcome	13. the heavy bear caused the roof to crack.
internal response	14. The fox heard the noise
attempt	15. and tried to run out,
outcome	16. but it was too late.
outcome	17. The roof and the bear fell in
(last) outcome	18. and trapped them both in the henhouse.
reaction	19. The fox and the bear were afraid
resolution	20. because they were surely caught now.


HIERARCHICAL LEVEL
Story
Setting
Episode system
Characters
Theme
Plot
Resolution
1
Initiating Event
Goal
Episode
Event
Reaction
2
3
4
Internal Response
Attempt
Outcome
20
19
Thought
Event
18
They know chickens were in the henhouse
Episode
Episode
Episode
Episode
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
Subgoal
Event
Event
Subgoal
Event
Event
Subgoal
Event
Event
Thought
Event
Event
5
7
6
17
10
11
14
15
16
They decide to go to henhouse
They arrive at henhouse
Decides to grab chicken
Event
Event
Event
13
8
9
12

The Wolf and the Crane

Category	Story Text
setting	1. Once a wolf was eating an animal
setting	2. he had killed.
initiating event	3. Suddenly, a bone stuck in his throat.
internal response	4. He soon felt terrible pain
attempt	5. and ran up and down,
attempt	6. calling as loudly as he could.
goal	7. He wanted someone to remove the bone
attempt	8. and promised a reward
outcome	9. At last a crane agreed to try.
attempt	10. He told the wolf to open his jaws very wide.
attempt	11. The crane put his long neck down the wolf's throat.
outcome	12. and with his beak loosened the bone
outcome	13. till at last he got it out.
(last) outcome	14. The crane asked for his reward.
resolution	15. The wolf grinned and said:
reaction	16. "Be happy.
resolution	17. You have put your head inside a wolf's mouth
resolution	18. and taken it out again in safety.
resolution	19. That is enough reward for you."


HIERARCHICAL LEVEL
1
2
3
4
5
Story
Setting
Episode System
Characters
Theme
Plot
Resolution
1
2
Initiating Event
Goal
Episode
Event
Reaction
3
7
15
17
18
19
16
Internal Response
Attempt
Outcome
Feeling
Event
4
14
Episode
Episode
Episode
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
Internal Response
Attempt
Outcome
Subgoal
Event
Event
Subgoal
Event
Event
Subgoal
Episode
Event
Wolf wants someone to come
5
6
A crane heard him
Wolf wants crane to agree
8
9
Crane wants to remove bone
13
Internal Response
Attempt
Outcome
Subgoal
Event
Event
Crane wants to loosen bone
11
12
Event
10